Chameleon AIS339

General description

The AIS339 Chameleon is an AFE designed to enable signal capture in difficult real-world environments. Baseline capture, common mode accelerated recapture, noise rejection, nuisance signal nulling, multi-order analog filtering, and an up to 3rd order almost all pass (Bessel) with mHz bandpass low-end corner are example capabilities. To accomplish this the AIS339 includes: i) five input channels and a single reference channel; ii) a programmable gain amplifier (PGA); iii) differential voltage input or transconductor current mode input; iv) a high common mode rejection driver; v) a fast programmable local loop to allow fast capture & recapture of the common mode; vi) a sample and hold circuit allowing fast recovery from events which move the baseline; viii) an up to 6th order]high order programmable filter response; ix) a buffered differential voltage input between the negative terminals of the instrumentation amplifier to null nuisance signals*; x) analog or ADC outputs; xi) an optional two terminal common mode driver; xii) amplifier offset and shift registers. Between the amplifier and the ADC, the AIS339 compares to sigma delta solutions with an ENOB of 18 bits but requires substantially less current. The AIS339 is capable of Nyquist rate sampling between multiple different sensors*. Sample & Hold and fast drift recovery circuitry is provided to remember each sensor's common mode and return to it when a channel is selected. Also included is a precision on chip analog reference and charge pump to maximize the input common mode range. The AIS339 will operate with a supply voltage as low as 2.7V up to 3.6V and is available in a 5x5x0.75mm 48-pin QFN package. *Patents issued or Pending

Package illustration

Features

- **Offers multiple systems to ease capture of sensor data:**
  - Programmable Gain Amplifier (PGA)
  - up to 18 bit ENOB overall accuracy (between Amplifier & ADC)
  - >120dB CMRR rejection
  - SPI based time constant loop adjust for fast signal recapture
  - INA tap to allow nulling, lattice wave prediction or DSP in the loop
  - Baseline Sample & Hold for each channel to allow multi-channel Nyquist rate sampling
- **Allows Closed Loop DSP Around INA**
- **6 Input (5xMultiplexer, One Ref Channel)**
- **Voltage Gain or Transconductor Mode**
- **Low Noise INA with Digitally Programmed AGC**
- **SPI Interface**
- **Charge Pump to expand Input Range**
- **Precision Analog Reference**
- **10-Bit ADC with Separate Enable/Fast Wakeup**
- **Multi-order Bandpass Filter Response**
- **150uV Maximum Offset Voltage**
- **5uV inband input referred noise**
- **170uA Supply Current**
- **48 pin QFN 5x5x0.75 mm**

Applications

- Optical PPG (Pulse) or Electrical (ECG) sensing
- ECG, PPG, SPO2, Biometric Extraction
- Heart & Muscle ID
- Real time wavelet processing
- Gas Sensors
- Vibration Monitoring
- Audio Monitoring